

Litter Treatments: Matching Products with Management Goals

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Identifying the litter treatment(s) that best matches the management goals of a poultry farm is a complex process. There are three basic steps involved in the selection of a litter treatment. First is to identify all the key management-related issues that need to be addressed with a litter treatment. Next is to assess the efficacy of these products in addressing these issues. And perhaps most difficult, is matching the product with individual management programs and goals that provide the greatest return on your investment. The following outline contains factors to consider in this process.

- I. Potential management-related goals of a litter treatment program may include:
 - A. Reduce ammonia to achieve one or more of the following:
 - Improve performance and achieve genetic potential of modern birds
 - Reduce fuel cost
 - Reuse litter for multiple flocks
 - B. Improve farm management-related concerns or cost associated with:
 - Marginal farm managers or housing
 - High bird density
 - High cost associated with replacement bedding and clean-out of houses
 - Poor litter quality and wet litter
 - Litter and ammonia-related carcass quality issues
 - C. Reduce health-related issues that may be due to:
 - Severe vaccination reactions
 - Ammonia-related stress factors and health issues
 - Disease challenges associated with poor farm management, a persistent farm disease challenge, short layout, or built-up litter program
 - D. Address on-farm food safety issues by:
 - Decreasing food-borne pathogens in litter
 - Lowering darkling beetle populations

- E. Assist with meeting growing welfare concerns associated with:
 - The environment for people working in houses
 - Ammonia standards to meet poultry welfare guidelines

- F. Address current and emerging environmental-related concerns by:
 - Prolonging the reuse of litter and limit waste management concerns related to cleanout, storage, handling and land application of litter
 - Enhancing the composition of litter for end-use markets
 - Limiting the emissions of ammonia and odor from poultry houses

II. Types and characteristics of litter treatments¹

A. Chemical litter treatments – acidifying agents, act to temporarily bind or inhibit ammonia release and acidify the litter surface. Pathogens on the litter surface may be temporarily suppressed in the acidic environment, litter moisture may be reduced and/or the composition of litter for end-use markets may be altered. At standard application rates, these products are generally the most effective in ammonia suppression but the duration of control is limited to several weeks and may be highly variable due to numerous managerial factors. Of all litter treatments used in the United States, the market is dominated by the following three acidifying products:

- Sodium bisulfate (PLT). When properly activated, this treatment provides immediate litter acidification, ammonia suppression and an ionic effect that enhances acidification efficacy. Ammonium sulfate, a water-soluble fertilizer and sodium sulfate are by-products of this chemical reaction.
- Acidified clay (Poultry Guard). This clay granular material impregnated with sulfuric acid provides immediate litter acidification and ammonia control without an activation step. Ammonium sulfate, a water-soluble fertilizer and spent clay are by-products of the chemical reaction.
- Aluminum sulfate (Al Clear). With adequate litter moisture and time for activation, aluminum sulfate provides, litter acidification, ammonia suppression, and at rates of application greater than those recommended for ammonia control, may also bind significant amounts of soluble phosphorus in litter. Ammonium sulfate, a water-soluble fertilizer and aluminum phosphate salts, are by-products of this reaction. How the litter is used upon removal from the house may be a factor in selection of this litter treatment.

¹ It is not the intent of the author to endorse or recommend any litter treatment, merely to identify examples of some common products and their general characteristics.

- B. Chemical litter treatments – binding agents, may act to chemically bind; absorb ammonia or litter moisture; or alter the degradation of uric acid to ammonia. Examples of commercial litter treatment products in this category include Barn Fresh (clay-based), Mistral (desiccant) and Ammonia Hold (mineral by-product). As a “general rule” these products have not provided the level of ammonia suppression as the acidifying agents nor has their ammonia control been consistent or immediate following application. For the clay and desiccant products, efficacy in reducing bacterial pathogens is often associated with their ability to reduced litter moisture.

- C. Microbial and urease inhibitor litter treatments act to suppress the litter microbes responsible for the degradation of uric acid to ammonia or chemically inhibit this chemical process. Early research with para- formaldehyde flakes and volatile fatty acids indicate efficacy as both an antimicrobial agent and a litter acidifier. Salt and sulfur treatment of house pads and litter are another example of microbial inhibitors used to selectively address certain farm problems. One of the oldest litter treatments to inhibit litter microflora is hydrated lime. Examples of chemical urease inhibitors to litter (or manure) include cyclohexylphosphoric triamide (CHPT), phenyl phosphorodiamidate (PPDA) and N-(n-butyl) thiophosphoric triamide (NBPT). Saponin and glycocomponents, natural extracts from the *Yucca schidigera* plant, offer ammonia suppression when added to litter (some are also feed or water additives). The mode of action of these yucca extracts were once believed to be a urease inhibitor and a microbial stimulant; recent research suggests it might actually bind ammonia. In general, the microbial and urease inhibitor litter treatments offer partial ammonia suppression, are temporary and require repeated re-treatment for consistent results. The following is a partial list of commercial yucca-base litter treatments; De-Odorase, YS-50, Biosupreme L, Inhibodor and Ultra Litter Treatment (this product is a blend with organic acids and sodium salts).

- D. Biological litter treatments represent a class of products that may be a blend of non-pathogenic microorganisms, enzymes and stimulants that may alter the litter microflora while improving litter quality and providing marginal reductions in ammonia. Micro Treat P and Impact P are examples of two such commercial biological litter treatments. When applied according to manufacturer’s recommendations, the major benefit of these products may be from improvements in bird performance and carcass quality.

III. Matching litter treatments with management goals will require:

- A. Identify production-related issues where litter treatments “may” help.
- B. Identify litter treatments that may assist with these priority production concerns.
- C. Why it is important and how to test litter treatments.
 - A comparative study of the various litter treatments on production parameters under a wide range of production systems has not been conducted

- Seek the technical assistance from the manufacturer on proper usage procedures and educate growers on how to correctly apply and manage the treated litter
- Closely monitor all performance aspects on multiple farms over numerous flocks
- Evaluate return on investment based on grower, company, environmental and society benefits.
- Needs assessment and litter treatment testing should be an on-going process